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(54) **Herbicidal composition.**

(57) A herbicidal composition which comprises as the active ingredients (a) 2-(4-chloro-2-fluoro-5-propargyloxyphenyl)-5,6,7,8-tetrahydro-1H-1,2,4-triazolo-(1,2-a)-pyridazine-1,3-2H-dione and (b) at least one of N-(phosphonomethyl)glysine and its salts (glyphosate), *DL*-homoalanin-4-yl(methyl)-phosphinic acid and its salts (glufosinate), 2-amino-4-[(hydroxy) (methyl) phosphionyl]-butyrylalanylalanine and its salts (bialaphos) and 1,1'-dimethyl-4,4'-bipyridinium ion and its salts (paraquat), and an inert carrier or diluent. Said composition exerts an enhanced herbicidal potency.

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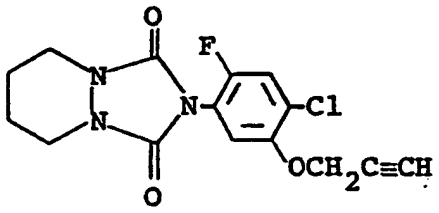
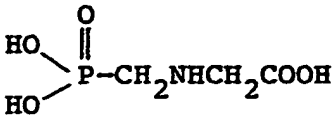
HERBICIDAL COMPOSITION

The present invention relates to a herbicidal composition. More particularly, it relates to a herbicidal composition comprising as the active ingredients (a) 2-(4-chloro-2-fluoro-5-propargyloxyphenyl)-5,6,7,8-tetrahydro-1H-1,2,4-triazolo-(1,2-a)pyridazine-1,3-2H-dione (hereinafter referred to as "Compound (I)") of the formula:



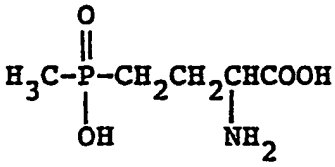
(I)

and (b) at least one of N-(phosphonomethyl)glycine of the formula:



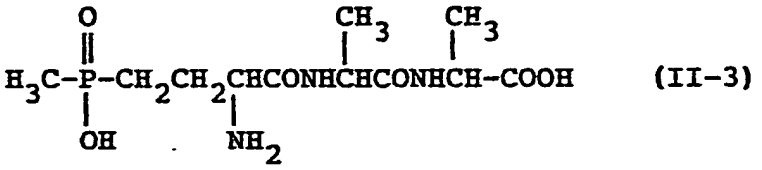
(II-1)

or its salt ((hereinafter referred to as "glyphosate"), DL-homoalanin-4-yl(methyl)phosphinic acid of the formula:



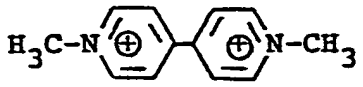
(II-2)

or its salt (hereinafter referred to as "glufosinate"), 2-amino-4-[(hydroxy)(methyl)phosphionyl]butyrylalanylalanine of the formula:



(II-3)

or its salt (hereinafter referred to as "bialaphos"), and 1,1'-dimethyl-4-4'-bipyridinium ion of the formula:



(II-4)

or its salt (hereinafter referred to as "paraquat"), which exerts a highly enhanced herbicidal activity against a wide variety of weeds without causing any material phytotoxicity to crop plants.

In recent years, there have been used a great number of chemicals having herbicidal activities in order to exterminate or control undesired vegetation of weeds in agricultural and non-agricultural fields. Since, however, weeds are diversified in kinds and grow over a long period of time, the herbicidal effects of conventional herbicidal agents are restricted in general. Under the circumstances, the appearance of any herbicidal agent exerting a strong herbicidal activity as well as a broad herbicidal spectrum over a wide variety of weeds has been highly demanded.

As a result of the extensive study, it has now been found that the associated use of (a) Compound (I) with (b) at least one of glyphosate (II-1), glufosinate (II-2), bialaphos (II-3) and paraquat (II-4), these being hereinafter referred to as "Compounds (II)", produces a highly

enhanced herbicidal activity against a wide variety of weeds in agricultural and non-agricultural fields. In comparison with the sole use of each of said active ingredients, enhancement of the herbicidal potency on such associated use is remarkable so that the active ingredients may be applied in smaller dosages. Further, the weed-control spectrum is greatly enlarged. Thus, a clear and definite synergistic effect is observed in said associated use.

The herbicidal composition of the invention can exterminate or control a variety of weeds, of which typical examples are broad-leaved weeds such as wild buckwheat (Polygonum convolvulus), pale smartweed (Polygonum lapathifolium), common purslane (Portulaca oleracea), common chickweed (Stellaria media), common lambsquarters (Chenopodium album), redroot pigweed (Amaranthus retroflexus), radish (Raphanus sativus), wild mustard (Sinapis arvensis), shepherdspurse (Capsella bursa-pastoris), hemp sesbania (Sesbania exaltata), sicklepod (Cassia obtusifolia), velvetleaf (Abutilon theophrasti), prickly sida (Sida spinosa), field pansy (Viola arvensis), cleavers (Galium aparine), ivyleaf morningglory (Ipomoea hederacea), tall morningglory (Pharbitis purpurea), field bindweed (Convolvulus arvensis), purple deadnettle (Lamium purpureum), henbit (Lamium amplexicaure), jimsonweed (Datura stramonium), black nightshade (Solanum nigrum), persian speedwell (Veronica persica), common cocklebur (Xanthium strumarium), common sunflower (Helianthus annuus), scentless chamomil

(Matricaria perforata), corn marigold (Chrysanthemum segetum), curly dock (Rumex crispus), Japanese mugwort (Artemisia princeps) and common ragweed (Ambrosia artemisiifolia); graminaceous weeds such as japanese millet (Echinochloa frumentacea), barnyardgrass (Echinochloa crus-galli), green foxtail (Setaria viridis), large crabgrass (Digitaria sanguinalis), annual bluegrass (Poa annua), blackgrass (Alopecurus myosuroides), oats (Avena sativa), wild oats (Avena fatua), johnsongrass (Sorghum halepense), quackgrass (Agropyron repens), downy brome (Bromus tectorum) and bermudagrass (Cynodon dactylon); commelinaceous weeds such as asiatic dayflower (Commelina communis); and cyperaceous weeds such as rice flatsedge (Cyperus iria) and purple nutsedge (Cyperus rotundus), etc.

Compound (I) is known to exert a herbicidal activity (U.S. patent 4,452,981). Glyphosate (II-1) is described in C.R. Worthing et al: The Pesticide Manual , 7, 303 (1983) published by The British Crop Protection Council and known as a herbicide. As the salt, there may be exemplified isopropylamine salt, etc. Glufosinate (II-2) is described in Thomson: Agricultural Chemicals Book II, Herbicides, page 224, (1983) and known as a herbicide. As the salt, there may be used ammonium salts, etc. Bialaphos (II-3) is described in Hodogaya Kagaku: Short Review of Herbicide, page 210, (1982) and known as a herbicide. As the salt, there may be used sodium salts, etc. Paraquat (II-4) is described in W. T. Thomson: Agricultural Chemicals Book II, Herbicides, page 111 (1983) and known as

a herbicide. As the salt, there may be exemplified dichloride, dimethylsulfate, etc. However, the associated use of Compound (I) with any of Compounds (II) has never been attempted, and the production of said synergistic effect on such associated use has never been expected.

The proportion of Compound (I) as the component (a) and Compound(s) (II) as the component (b) in the composition of the invention may vary in a considerably broad range and is usually within a range of 1 : 0.1 to 1 : 70 by weight. When Compound (II) is glyphosate (II-1), its amount is preferably from 0.5 to 50 parts by weight, especially from 1 to 32 parts by weight, to one part by weight of Compound (I). When glufosinate (II-2) is used as Compound (II), its amount is favorably from 0.1 to 70 parts by weight, particularly from 0.5 to 50 parts by weight, to one part by weight of Compound (I). In case of Compound (II) being bialaphos (II-3), it may be used preferably in an amount of from 0.1 to 70 parts by weight, especially from 0.5 to 70 parts by weight, to one part by weight of Compound (I). Further, in case of Compound (II) being paraquat (II-4), it may be be used preferably in an amount of from 0.1 to 50 parts by weight, especially from 0.2 to 40 parts by weight, to one part by weight of Compound (I).

In addition to the above active ingredients, the composition may contain a solid or liquid carrier or diluent. Any surface active or auxiliary agent may be also contained therein. Thus, the composition may be formulated in any conventional preparation form such as emulsifiable

concentrate, wettable powder or suspension. The total content of the active ingredients, i.e. Compound (I) and Compound(s) (II), may be from 1 to 90 % by weight, preferably from 2 to 80 % by weight.

As the solid carrier or diluent, there may be used kaolin clay, attapulgite clay, bentonite, terra alba, pyrophyllite, talc, diatomaceous earth, calcite, wallnut-shell powder, urea, ammonium sulfate, synthetic hydrated silica, etc. Examples of the liquid carrier or diluent are aromatic hydrocarbons (e.g. xylene, methylnaphthalene), alcohols (e.g. isopropanol, ethylene glycol, cellosolve), ketones (e.g. acetone, cyclohexanone, isophorone), vegetable oils (e.g. soybean oil, cotton-seed oil), dimethylsulfoxide, acetonitrile, water, etc.

The surface active agent used for emulsification, dispersion or spreading may be any of the anionic and non-ionic type of agents. Examples of the surface active agent include alkylsulfates, alkylarylsulfonates, dialkylsulfosuccinates, phosphates of polyoxyethylenealkylaryl ethers, polyoxyethylene alkyl ethers, polyoxyethylene alkylaryl ethers, polyoxyethylene polyoxypropylene block copolymers, sorbitan fatty acid esters, polyoxyethylene sorbitan fatty acid esters, etc. Examples of the auxiliary agents include ligninsulfonates, sodium alginate, polyvinyl alcohol, gum arabic, CMC (carboxymethyl cellulose), PAP (isopropyl acid phosphate), etc.

Practical embodiments of the composition are illustratively shown in the following Formulation Examples

wherein part(s) are by weight.

Formulation Example 1

Twenty-five parts of Compound (I), 25 parts of glyphosate (free form), 3 parts of calcium ligninsulfonate, 2 parts of sodium laurylsulfate and 45 parts of synthetic hydrous silica are well mixed and pulverized to make a wettable powder.

Formulation Example 2

Five parts of Compound (I), 20 parts of glyphosate (free form), 3 parts of polyoxyethylene sorbitan monooleate, 3 parts of CMC and 69 parts of water are mixed and pulverized until the particle size becomes less than 5 microns to make a suspension.

Formulation Example 3

Twenty-five parts of Compound (I), 25 parts of glufosinate (ammonium salt), 3 parts of calcium lignin-sulfonate, 2 parts of sodium laurylsulfate and 45 parts of synthetic hydrous silica are well mixed and pulverized to make a wettable powder.

Formulation Example 4

Ten parts of Compound (I), 15 parts of glufosinate (ammonium salt), 3 parts of polyoxyethylene sorbitan monooleate, 3 parts of CMC and 69 parts of water are mixed and pulverized until the particle size becomes less than 5 microns to make a suspension.

Formulation Example 5

Twenty-five parts of Compound (I), 25 parts of bialaphos (sodium salt), 3 parts of calcium ligninsulfonate,

2 parts of sodium laurylsulfat and 45 parts of synthetic hydrous silica are well mixed and pulverized to make a wettable powder.

Formulation Example 6

Ten parts of Compound (I), 15 parts of bialaphos (sodium salt), 3 parts of polyoxyethylene sorbitan monooleate, 3 parts of CMC and 69 parts of water are mixed and pulverized until the particle size becomes less than 5 microns to make a suspension.

Formulation Example 7

Twenty-five parts of Compound (I), 25 parts of paraquat (dichloride), 3 parts of calcium ligninsulfonate, 2 parts of sodium laurylsulfate and 45 parts of synthetic hydrous silica are well mixed and pulverized to make a wettable powder.

Formulation Example 8

Ten parts of Compound (I), 15 parts of paraquat (dichloride), 3 parts of polyoxyethylene sorbitan monooleate, 3 parts of CMC and 69 parts of water are mixed and pulverized until the particle size becomes less than 5 microns to make a suspension.

A composition comprising Compound (I) and Compound(s) (II) thus formulated is useful for post-emergence control of undesired weeds by foliar treatment. The foliar treatment may be effected by spraying the composition containing Compound (I) and Compound(s) (II) over the top of plants. The direct application may also be adopted. The composition may be also useful for pre-emergence control of

undesired weeds by soil treatment. By this treatment, undesirable vegetation of weeds is controlled with exertion of no material phytotoxicty to important crop plants such as soybean, cotton, corn and wheat.

In order to improve the herbicidal activity, the composition may be used with other herbicides. Besides, it may be used in combination with insecticides, acaricides, nematocides, fungicides, plant growth regulators, fertilizers, soil improvers, etc.

The composition of the invention is widely used as the herbicide applicable in plowed field, non-cropping land, orchards, pasture land, lawn, forest, non-agricultural fields, etc. Further, the composition of the invention may be applied by way of non-tillage farming other than normal application.

The dosage of the active ingredients may vary depending on prevailing weather conditions, soil involved, formulation used, mixing proportion of each active ingredient, crop and weed species, etc. In general, however, the total amount of Compound (I) and Compound(s) (II) may be within a range of about 1 to 80 grams per are. When Compound (II) is glyphosate (II-1), said total amount is preferred to be from about 1 to 50 grams per are, especially from about 2 to 25 grams per are. When Compound (II) is glufosinate (II-2), said total amount may be favorably from about 1 to 80 grams per are, particularly from about 3 to 50 grams per are. When Compound (II) is bialaphos (II-3), said total amount is preferred to be from about 1 to 80 grams per

are, especially from about 3 to 50 grams per are. When Compound (II) is paraquat (II-4), said total amount is usually from about 1 to 50 grams per are, particularly from about 3 to 25 grams per are.

In case of the composition being in the form of emulsifiable concentrate, wettable powder, suspension or the like, it is normally diluted with water and applied over the top at a volume of about 1 to 10 liters per are to the foliage of the crop plants or weeds which germinate or have germinated. The dilution may include, in addition to the above mentioned surface active agent, any spreading or auxiliary agent such as polyoxyethylene resin acid esters, ligninsulfonates, abietic acid, dinaphthylmethanedisulfonates, paraffin and the like.

The herbicidal activity of the composition of the invention will be explained in further detail with reference to the following Test Examples wherein the growth control percentage (%) was determined by weighing the aerial parts of the test plants (fresh weight) and making calculation according to the following equation:

$$\text{Growth control percentage (\%)} = \left\{1 - \frac{\text{Fresh weight of test plant in treated plot}}{\text{Fresh weight of test plant in untreated plot}}\right\} \times 100$$

The phytotoxicity to crop plants was visually observed.

Test Example 1

Tubers of purple nutsedge and rootstalks of johnsongrass were transplanted in a vat (33 x 23 cm^2, 11 cm

(H)) filled with upland fi ld soil and cultivated in a greenhouse for 35 days. A designated amount of the composition in the form of a wettable powder formulated according to the above Formulation Example was diluted with water containing a spreading agent and sprayed to the foliage of the test plants at a spray volume of 5 liters per are by the aid of a small hand sprayer. After 28 days' cultivation in the greenhouse, the growth control percentage was observed. The results are shown in Tables 1-1 to 1-3. At the time of treatment, the test plants were in general at 5 to 9-leaf stage and 20 to 60 cm in height, although the growing stage varied depending on each species.

Table 1-1

Compound No.	Dosage (g/a)	Mixing ratio	Growth control percentage (%)	
			Purple nutsedge	Johnson-grass
Compound (I)	10	-	100	80
	5	-	85	65
	2.5	-	50	40
	1.25	-	20	10
	0.63	-	5	0
Glyphosate (free form) (II-1)	40	-	90	95
	20	-	60	75
	10	-	40	50
	5	-	15	20
	2.5	-	0	5
Compound (I) + Glyphosate (free form) (II-1)	5 + 20	1:4	100	100
	5 + 10	1:2	100	100
	5 + 5	1:1	100	100
	5 + 2.5	2:1	100	90
	2.5 + 20	1:8	100	100
	2.5 + 10	1:4	100	100
	2.5 + 5	1:2	100	95
	2.5 + 2.5	1:1	80	70
	1.25 + 20	1:16	100	100
	1.25 + 10	1:8	100	100
	1.25 + 5	1:4	80	80
	1.25 + 2.5	1:2	50	55
	0.63 + 20	1:32	100	100
	0.63 + 10	1:16	80	90
	0.63 + 5	1:8	60	70
	0.63 + 2.5	1:4	45	50

Table 1-2

Compound No.	Dosage (g/a)	Mixing ratio	Growth control percentage (%)	
			Purple nutsedge	Johnson-grass
Compound (I)	10	-	100	80
	5	-	85	65
	2.5	-	50	40
	1.25	-	20	10
	0.63	-	5	0
Glufosinate (ammonium salt) (II-2)	80	-	100	95
	40	-	70	70
	20	-	45	50
	10	-	10	10
	5	-	0	0
Compound (I) + Glufosinate (ammonium salt) (II-2)	5 + 40	1:8	100	100
	5 + 20	1:4	100	100
	5 + 10	1:2	100	95
	5 + 5	1:1	100	80
	2.5 + 40	1:16	100	100
	2.5 + 20	1:8	100	100
	2.5 + 10	1:4	80	75
	2.5 + 5	1:2	60	55
	1.25 + 40	1:32	95	100
	1.25 + 20	1:16	85	70
	1.25 + 10	1:8	60	40
	1.25 + 5	1:4	30	25
	0.63 + 40	1:64	85	90
	0.63 + 20	1:32	60	65
	0.63 + 10	1:16	25	35
	0.63 + 5	1:8	10	20

Table 1-3

Compound No.	Dosage (g/a)	Mixing ratio	Growth control percentage (%)	
			Purple nutsedge	Johnson-grass
Compound (I)	10	-	100	80
	5	-	85	65
	2.5	-	50	40
	1.25	-	20	10
	0.63	-	5	0
Bialaphos (sodium salt) (II-3)	80	-	95	90
	40	-	65	70
	20	-	40	45
	10	-	10	15
	5	-	0	0
Compound (I) + Bialaphos (sodium salt) (II-3)	5 + 40	1:8	100	100
	5 + 20	1:4	100	100
	5 + 10	1:2	100	90
	5 + 5	1:1	100	75
	2.5 + 40	1:16	100	100
	2.5 + 20	1:8	100	100
	2.5 + 10	1:4	75	70
	2.5 + 5	1:2	60	55
	1.25 + 40	1:32	95	95
	1.25 + 20	1:16	80	65
	1.25 + 10	1:8	55	40
	1.25 + 5	1:4	30	25
	0.63 + 40	1:64	80	85
	0.63 + 20	1:32	60	65
	0.63 + 10	1:16	25	35
	0.63 + 5	1:8	10	15

Test Example 2

Shortstalks of curly dock and rootstalks of Japanese mugwort were transplanted in a vat (33 x 23 cm^2, 11 cm (H)) filled with upland field soil and cultivated in a greenhouse for 35 days. A designated amount of the composition in the form of a wettable powder formulated according to the above Formulation Example was diluted with water containing a spreading agent and sprayed to the foliage of the test plants at a spray volume of 5 liters per are by the aid of a small hand sprayer. After 20 days' cultivation in the greenhouse, the growth control percentage was observed. The results are shown in Table 2. At the time of treatment, the test plants were in general at 5 to 9-leaf stage and 20 to 60 cm in height, although the growing stage varied depending on each species.

Table 2

Compound No.	Dosage (g/a)	Mixing ratio	Growth control percentage (%)	
			Curly dock	Japanese mugwort
Compound (I)	10	-	100	100
	5	-	95	85
	2.5	-	70	60
	1.25	-	40	30
	0.63	-	10	0
Paraquat (dichloride) (II-4)	20	-	100	100
	10	-	85	80
	5	-	75	45
	2.5	-	35	25
	1.25	-	10	10
Compound (I) + Paraquat (dichloride) (II-4)	5 + 10	1:2	100	100
	5 + 5	1:1	100	100
	5 + 2.5	2:1	100	100
	5 + 1.25	4:1	100	100
	2.5 + 10	1:4	100	100
	2.5 + 5	1:2	100	100
	2.5 + 2.5	1:1	100	95
	2.5 + 1.25	2:1	95	80
	1.25 + 10	1:8	100	100
	1.25 + 5	1:4	100	95
	1.25 + 2.5	1:2	80	75
	1.25 + 1.25	1:1	60	50
	0.63 + 10	1:16	100	100
	0.63 + 5	1:8	95	65
	0.63 + 2.5	1:4	70	50
	0.63 + 1.25	1:2	40	30

The results in Test Examples 1 and 2 were analyzed according to the isobor (i.e. equivalent efficacy line) method [Vol. 3, Herbicides, pages 109-111 (1981) in "Noyaku Jikkenho" (Methods in Pesticide Science) edited by Junichi Fukami et al, Soft Science Inc., Tokyo) based on the Tammes's method [Tammes, P.M.L.: Neth. J. Plant Path., 70,

73-80 (1964)]. Namely, several combinations of the compositions having different mixing ratios of Compound (I) or glyphosate (II-1), glufosinate (II-2), bialaphos (II-3) or paraquat (II-4) but exerting the same level of growth control effect, for example, 70 % growth control, were plotted in a graph so as to readily determine a synergistic effect, an arithmetic effect or a competitive effect. In case of exhibiting the synergistic effect, the equivalent efficacy line as plotted is shown below the arithmetic efficacy line.

Explaining further in detail with reference to the accompanying drawings, Figs. 1 and 2 wherein the ordinate indicates the dosage of glyphosate (free form) and the abscissa indicates the dosage of Compound (I), the equivalent efficacy line (i.e. solid line) of 70 % growth control of purple nutsedge (Fig. 1) or johnsongrass (Fig. 2) is located under the arithmetic efficacy line (i.e. dotted line), from which it is understood that the associated use of Compound (I) and glyphosate (free form) (II-1) in a certain mixing ratio produces the synergistic effect; Figs. 3 and 4 wherein the ordinate indicates the dosage of glufosinate (ammonium salt) (II-2) and the abscissa indicates the dosage of Compound (I), the equivalent efficacy line (i.e. solid line) of 70 % growth control of purple nutsedge (Fig. 3) or johnsongrass (Fig. 4) is located under the arithmetic efficacy line (i.e. dotted line), from which it is understood that the associated use of Compound (I) and glufosinate (ammonium salt) (II-2) in a certain

mixing ratio produces the synergistic effect; Figs. 5 and 6 wherein the ordinate indicates the dosage of bialaphos (II-3) and the abscissa indicates the dosage of Compound (I), the equivalent efficacy line (i.e. solid line) of 70 % growth control of purple nutsedge (Fig. 5) or johnsongrass (Fig. 6) is located under the arithmetic efficacy line (i.e. dotted line), from which it is understood that the associated use of Compound (I) and bialaphos (II-3) in a certain mixing ratio produces the synergistic effect; likewise, Figs. 7 and 8 of the accompanying drawing wherein the ordinate indicates the dosage of paraquat (dichloride) (II-4) and the abscissa indicates the dosage of Compound (I), the equivalent efficacy line (i.e. solid line) of 70 % growth control of curly dock (Fig. 7) or Japanese mugwort (Fig. 8) is located under the arithmetic efficacy line (i.e. dotted line), from which it is understood that the associated use of Compound (I) and paraquat (dichloride) (II-4) in a certain mixing ratio produces the synergistic effect.

Test Example 4

Seeds of barnyardgrass, green foxtail, large crabgrass, tall morningglory, velvetleaf, sicklepod, hemp sesbania, prickly sida, black nightshade, common cocklebur, common sunflower, common lambsquarters and redroot pigweed were sowed in a vat (33 x 23 cm^2, 11 cm (H)) filled with upland field soil and rootstalks of johnsongrass were transplanted therein, followed by cultivation in a greenhouse for 35 days. A designated amount of the composition in the form of a wettable powder formulated according to the

above Formulation Example was diluted with water containing a spreading agent and spray d to the foliage of the test plants at a spray volume of 5 liters per are by the aid of a small hand sprayer. After 28 days' cultivation in the greenhouse, the growth control percentage was observed. The results are shown in Table 3. At the time of treatment, the test plants were in general at 3 to 8-leaf stage and 5 to 60 cm in height, although the growing stage varied depending on each species.

Table 3

Compound No.	Dosage (g/a)	Growth control percentage (%)													
		Barn-yard-grass	Green fox-tail	Johnson-grass	Large crab-grass	Tall morning-glory	Velvet-leaf	Sickle-pod	Hemp sesbania	Prickly sida	Black night-shade	Common cock-lebur	Common sun-flower	Common lambs-quarters	Redroot pigweed
Compound (I)	2.5 12.5	70 90	65 90	40 85	65 90	80 100	100 100	75 100	85 100	90 100	80 100	80 100	85 100	100 100	100 100
Glyphosate (free form) (II-1)	12.5	70	75	55	70	50	35	40	30	30	45	40	45	55	50
Compound (I) + Glyphosate (free form) (II-1)	2.5 + 10	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Test Example 5

Seeds of barnyardgrass, green foxtail, large crabgrass, tall morningglory, v lvetleaf, sicklepod, common cocklebur and common sunflower were sowed in a vat (33 x 23 cm^2, 11 cm (H)) filled with upland field soil and rootstalks of johnsongrass were transplanted therein, followed by cultivation in a greenhouse for 35 days. A designated amount of the composition in the form of a wettable powder formulated according to the above Formulation Example was diluted with water containing a spreading agent and sprayed to the foliage of the test plants at a spray volume of 5 liters per are by the aid of a small hand sprayer. After 28 days' cultivation in the greenhouse, the growth control percentage was observed. The results are shown in Table 4. At the time of treatment, the test plants were in general at 3 to 8-leaf stage and 5 to 60 cm in height, although the growing stage varied depending on each species.

Table 4

Compound No.	Dosage (g/a)	Growth control percentage (%)								
		Barn-yard-grass	Green fox-tail	Johnson-grass	Large crab-grass	Tall morning-glory	Velvet-leaf	Sickle-pod	Common cock-lebur	Common sun-flower
Compound (I)	2.5	65	60	40	55	85	95	80	80	80
Glufosinate (ammonium salt) (II-2)	20	90	85	50	75	75	60	40	75	70
Compound (I) + Glufosinate (ammonium salt) (II-2)	2.5 + 20	100	100	100	100	100	100	100	100	100

Test Example 6

Seeds of barnyardgrass, green foxtail, large crabgrass, tall morningglory, velvetleaf, sicklepod, common cocklebur and common sunflower were sowed in a vat (33 x 23 cm^2, 11 cm (H)) filled with upland field soil and rootstalks of johnsongrass were transplanted therein, followed by cultivation in a greenhouse for 35 days. A designated amount of the composition in the form of a wettable powder formulated according to the above Formulation Example was diluted with water containing a spreading agent and sprayed to the foliage of the test plants at a spray volume of 5 liters per are by the aid of a small hand sprayer. After 28 days' cultivation in the greenhouse, the growth control percentage was observed. The results are shown in Table 5. At the time of treatment, the test plants were in general at 3 to 8-leaf stage and 5 to 60 cm in height, although the growing stage varied depending on each species.

Table 5

Compound No.	Dosage (g/a)	Growth control percentage (%)								
		Barn-yard-grass	Green fox-tail	Johnson-grass	Large crab-grass	Tall morning-glory	Velvet-leaf	Sickle-pod	Common cock-lebur	Common sun-flower
Compound (I)	2.5	65	60	40	55	85	95	80	80	80
Bialaphos (sodium salt) (II-3)	20	85	80	45	75	70	50	30	70	65
Compound (I) + Bialaphos (sodium salt) (II-3)	2.5 + 20	100	100	100	100	100	100	100	100	100

Test Example 7

Seeds of barnyardgrass, gr en foxtail, large crabgrass, tall morningglory, velvetleaf, sicklepod, hemp sesbania, prickly sida, black nightshade, common cocklebur, common sunflower, common lambsquarters and redroot pigweed were sowed in a vat (33 x 23 cm^2, 11 cm (H)) filled with upland field soil and rootstalks of johnsongrass were transplanted therein, followed by cultivation in a greenhouse for 35 days. A designated amount of the composition in the form of a wettable powder formulated according to the above Formulation Example was diluted with water containing a spreading agent and sprayed to the foliage of the test plants at a spray volume of 5 liters per are by the aid of a small hand sprayer. After 28 days' cultivation in the greenhouse, the growth control percentage was observed. The results are shown in Table 6. At the time of treatment, the test plants were in general at 3 to 8-leaf stage and 5 to 60 cm in height, although the growing stage varied depending on each species.

Table 6

Compound No.	Dosage (g/a)	Growth control percentage (%)													
		Barn-yard-grass	Green fox-tail	Johnson-grass	Large crab-grass	Tall morning-glory	Velvet-leaf	Sickle-pod	Hemp sesbania	Prickly sida	Black night-shade	Common cock-lebur	Common sun-flower	Common lambs-quarters	Redroot pigweed
Compound (I)	2.5	65	65	40	55	85	95	80	80	90	80	80	80	85	90
Paraquat (dichloride) (II-4)	5	75	75	65	70	70	35	40	45	35	55	50	65	60	55
Compound (I) + Paraquat (dichloride) (II-4)	2.5 + 5	100	100	100	100	100	100	100	100	100	100	100	100	100	100

What is claimed is:

1. A herbicidal composition which compris s as the active ingredients (a) 2-(4-chloro-2-fluoro-5-propargyl-oxyphenyl)-5,6,7,8-tetrahydro-1H-1,2,4-triazolo-(1,2-a)-pyridazine-1,3-2H-dione and (b) at least one of N-(phosphonomethyl)glysine and its salts (glyphosate), DL-homoalanin-4-yl(methyl)phosphinic acid and its salts (glufosinate), 2-amino-4-[(hydroxy)(methyl)phosphionyl]-butyrylalanylalanine and its salts (bialaphos) and 1,1'-dimethyl-4,4'-bipyridinium ion and its salts (paraquat), and an inert carrier or diluent.

2. The composition according to claim 1, wherein the weight proportion of the components (a) and (b) is from 1:0.1 to 1 : 70.

3. The composition according to claim 2, wherein the component (b) is glyphosate, and the weight proportion of the components (a) and (b) is from 1 : 0.5 to 1 : 50.

4. The composition according to claim 2, wherein the component (b) is glufosinate, and the weight proportion of the components (a) and (b) is from 1 : 0.1 to 1 : 70.

5. The composition according to claim 2, wherein the component (b) is bialaphos, and the weight proportion of the components (a) and (b) is from 1 : 0.1 to 1 : 70.

6. The composition according to claim 2, wherein the component (b) is paraquat, and the weight proportion of the components (a) and (b) is from 1 : 0.1 to 1 : 50.

7. A method for controlling weeds which comprises applying a herbicidally effective amount of the composition according to claim 1 to the weeds.

8. The method according to claim 7, wherein the total amount of the components (a) and (b) is from 1 to 80 grams per are.

9. The method according to claim 9, wherein the component (b) is glyphosate, and the total amount with the component (a) is from 1 to 50 grams per are.

10. The method according to claim 9, wherein the component (b) is glufosinate, and the total amount with the component (a) is from 1 to 80 grams per are.

11. The method according to claim 9, wherein the component (b) is bialaphos, and the total amount with the component (a) is from 1 to 80 grams per are.

12. The method according to claim 9, wherein the component (b) is paraquat, and the total amount with the component (a) is from 1 to 50 grams per are.

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Fig. 1

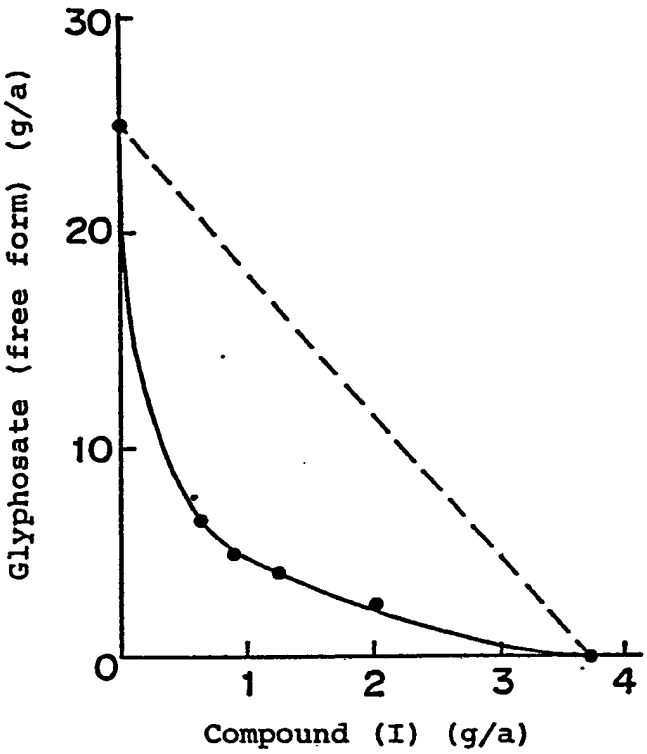


Fig. 2

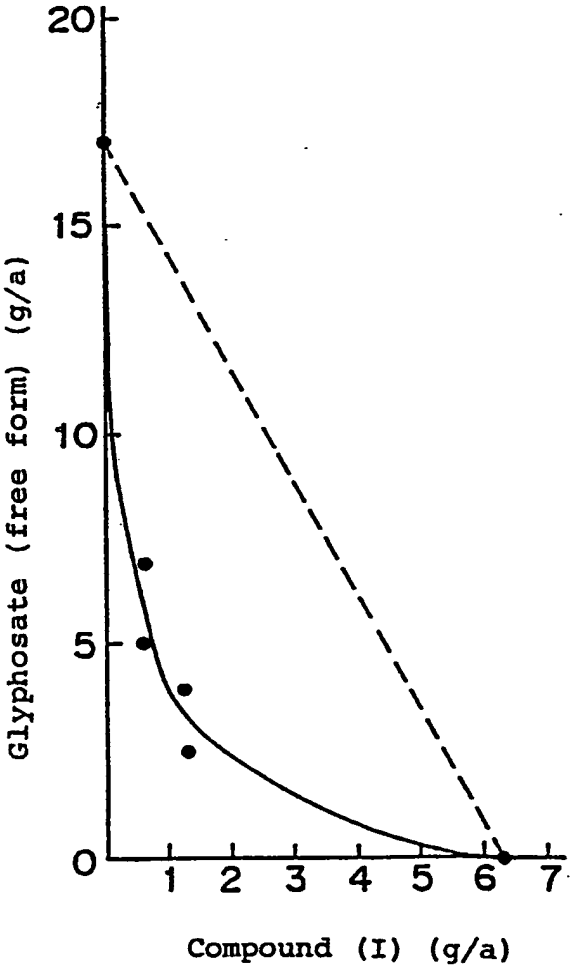
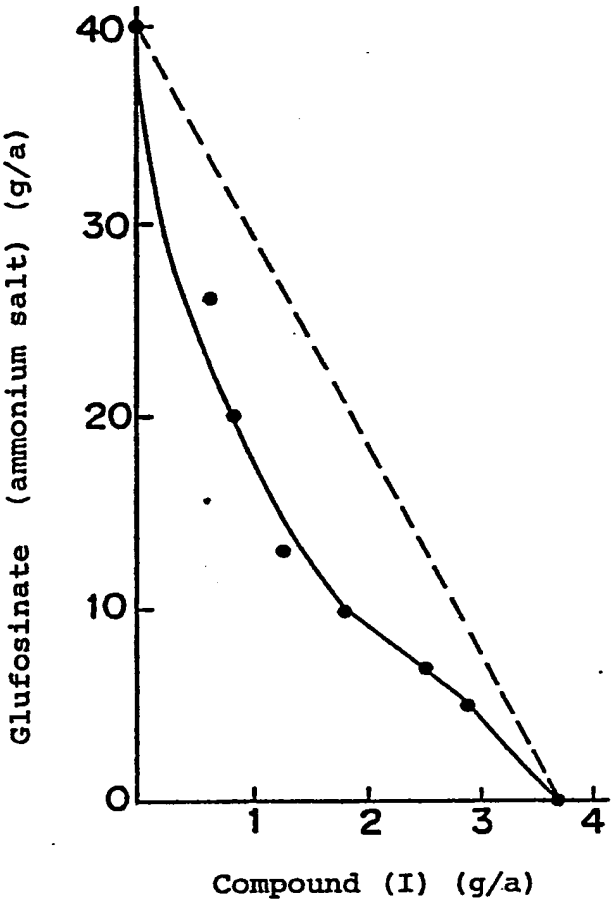


Fig. 3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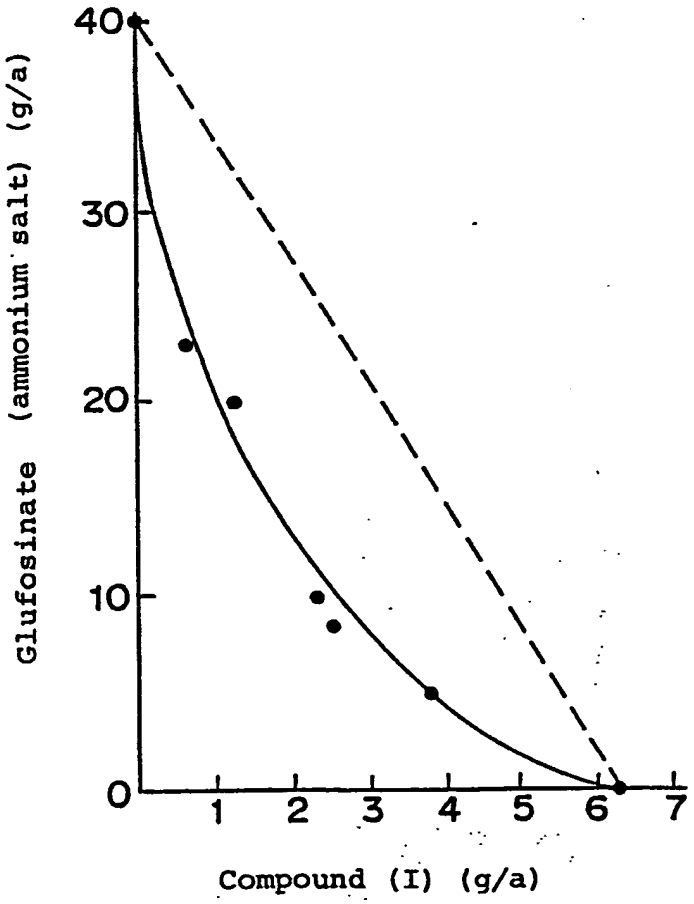
1
2
3
4
Glufosinate (ammonium salt) (g/a)
Compound (I) (g/a)

Fig. 4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30
20
10
0
1
2
3
4
5
6
7
Glufosinate (ammonium salt) (g/a)
Compound (I) (g/a)

Fig. 5

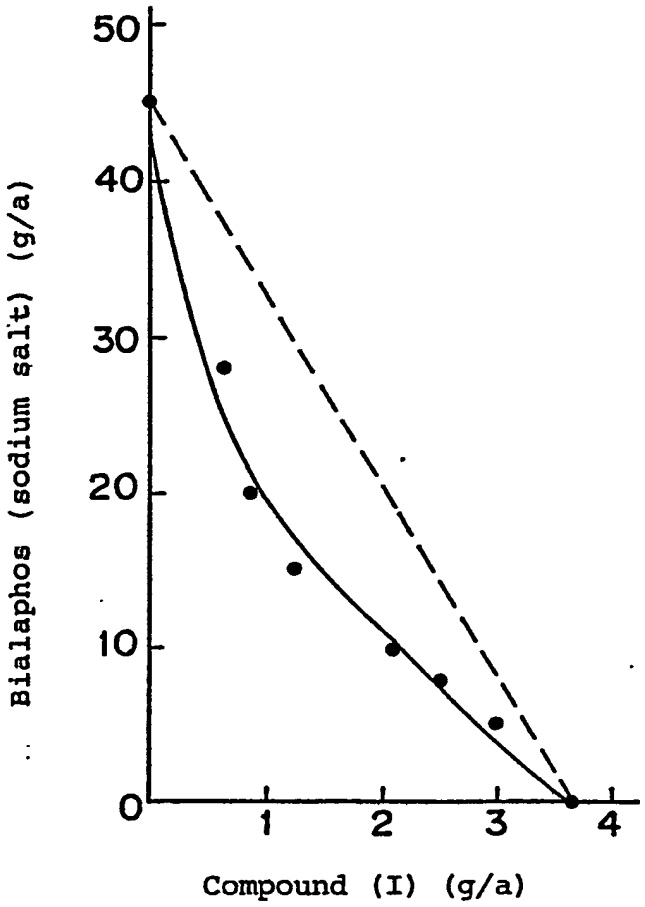
50
40
30
20
10
0
1
2
3
4
Bialaphos (sodium salt) (g/a)
Compound (I) (g/a)

Fig. 6

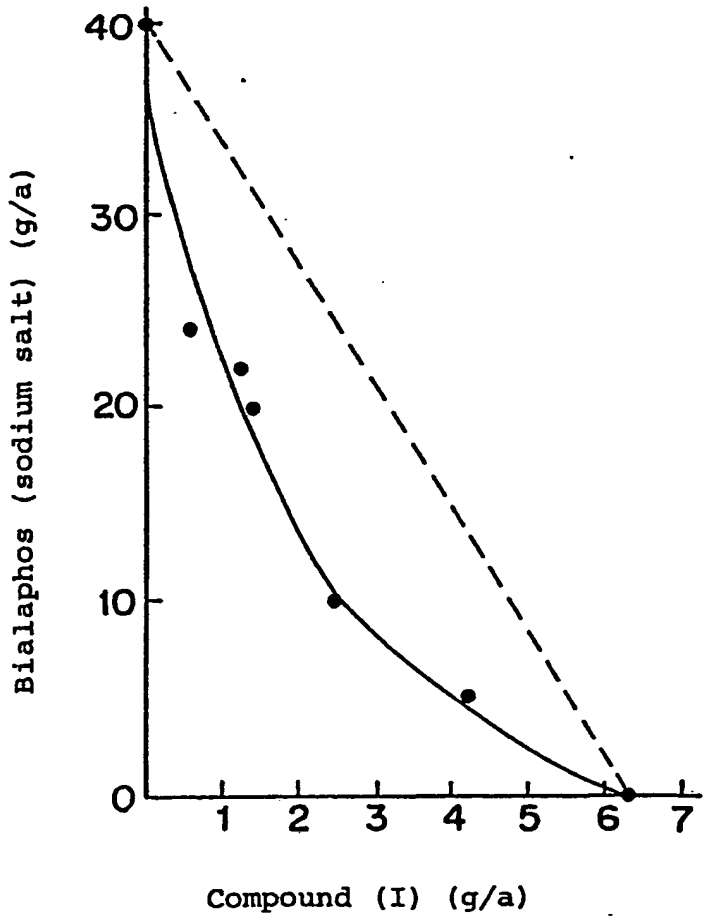
40
30
20
10
0
1
2
3
4
5
6
7
Bialaphos (sodium salt) (g/a)
Compound (I) (g/a)

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Fig. 7

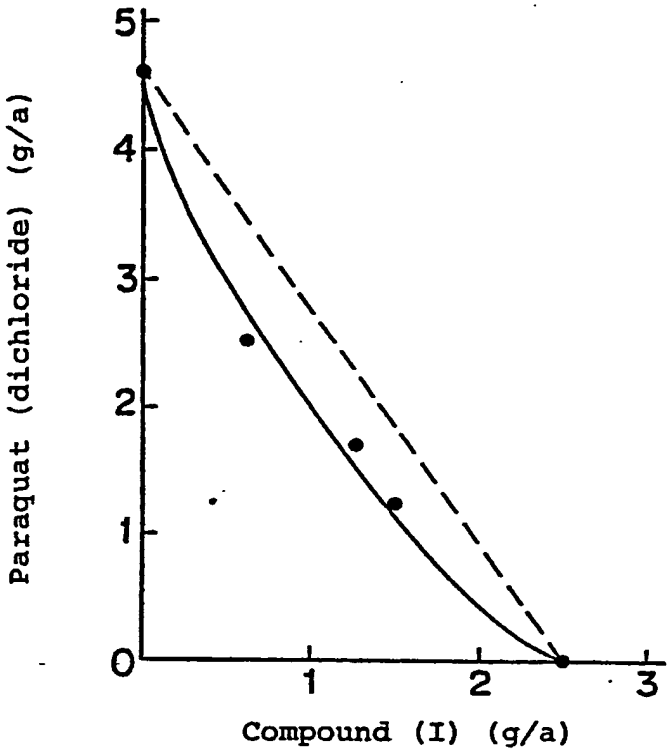

Fig. 8